Remarks

Claims 6, 7, 8, 18 and 19-26 were rejected under 35 U.S.C. 112, second paragraph, on grounds of indefiniteness. In response, the terms that were objected to have been amended or deleted to eliminate any aspect of indefiniteness.

Claims 1-26 were rejected for obviousness-type double patenting over claims 1-28 of U.S. Patent No. 6,713,762. In response, a terminal disclaimer over patent No. 6,713,762 is enclosed.

Claims 1-5 and 7-21 were rejected under 35 U.S.C. 103(a) over Ichikawa (U.S. Patent No. 5,025,243). This rejection was based in part upon these claims involving a detection of radiation having a wavelength less than about 10 micrometers, each reference disclosing a detection of infrared radiation, and an assertion that the "near" and "intermediate" infrared ranges are covered by the recited "less than about 10 micrometers" range.

In response, Ichikawa does not disclose any particular portion of the infrared spectrum at which it operates; it merely refers to infrared radiation in general. As recently stated by the Federal Circuit in In re Peterson, 65 USPQ2d 1379, 1383 (Fed. Cir. 2003), involving ranges of chemical compositions, "[T]he existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious... in general, an applicant may overcome a *prima facie* case of obviousness by establishing "that the [claimed] range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range (cite omitted)... That same standard applies when, as here, the applicant seeks to optimize certain variables by selecting narrow ranges from broader ranges disclosed in the prior art." (cite omitted).

Infrared radiation is defined as the region of the electromagnetic spectrum between 0.7 and 1,000 micrometers. (see Van Nostrand's Scientific Encyclopedia, seventh edition, Van Nostrand Reinhold, 1989, page 1551, copy enclosed herewith). Thus, the portion of the infrared spectrum "having a wavelength less than about 10 micrometers", as claimed, represents approximately one percent of the overall infrared range.

Finding a way to operate in the narrow portion of the infrared range below 10 micrometers constituted an "unexpected result" because, as stated at page 1, line 26 - page 2, line 3 of the present application, "acoustic absorption has not been observed in SiC for wavelengths below about 10 micrometers, thus eliminating part of the IR band along with shorter wavelengths", and the other radiation absorption mechanisms either do not function in the infrared range (bandgap absorption, page 21, lines 4-18), or occur only at the specific wavelengths corresponding to the absorption energy of an impurity in the SiC (page 2, lines 19-34).

Since it was not known in the art that SiC would absorb infrared radiation below 10 micrometers by acoustic absorption, and in fact exactly the opposite was believed to be the case, applicant has overcome the prima facie case of obviousness by showing that SiC actually can be made to exhibit substantial acoustic absorption for infrared wavelengths less than 10 micrometers. This discovery constitutes an unexpected result that is contrary to the knowledge in the art at the time the application was filed.

While it was known that, for a correctly selected impurity, SiC would exhibit absorption for infrared wavelengths less than 10 micrometers, such absorption occurred only at specific wavelengths corresponding to the impurity absorption energy, but not at other wavelengths. The distinction between acoustic and impurity absorption is further emphasized in the application as follows: "IR radiation absorbed via acoustic ab-

sorption is converted directly into heat energy and causes the resistance of the SiC to increase roughly linearly with the IR energy, as opposed to impurity absorption which causes the SiC resistance to drop." (page 4, lines 14-18). Applicant's discovery of a broad band acoustic absorption mechanism in SiC, as opposed to very narrow band impurity absorption, at infrared wavelengths below 10 micrometers, offers distinct advantages over the previously known impurity absorption mechanism.

There is no suggestion in Ichikawa of detecting the approximately 1% of the IR range having a wavelength less than about 10 micrometers, or of employing an acoustic absorption mechanism within this wavelength range. In fact, Ichikawa suggests that, even if the incident IR were selected to be less than 10 micrometers, any resulting absorption would not have been the result of acoustic absorption. In Ichikawa the diameter of the irradiated filament ranged from 8 to 30 microns in the various examples given. This contrasts with the preferred embodiment of the present invention:

> "Whereas no acoustic absorption has been observed for SiC at wavelengths below about 10 micrometers, applicant has discovered that a useful acoustic absorption mechanism can be obtained from SiC if it has a single crystal structure and its thickness is at least about 200 micrometers. While there may be some acoustic absorption with thinner samples, the amount is so small that it has not previously been observed." (Specification page 4, lines 7-14).

Thus, the SiC dimensions used in the references were too small to result in any observable acoustic absorption at wavelengths below 10 micrometers. Even at Ichikawa's upper limit of a 200 micron diameter (considerably larger than any of the fibers used in his examples), the fiber would be 200 microns thick only along its (infinitely narrow) center axis, which

would not be enough for any appreciable acoustic absorption. Applicant's rejected claims, except for 19-21, require that the thickness of the SiC body be at least 400 microns, the preferred thickness given in the specification (page 3, lines 7-12; page 4, lines 23-26). In disclosing a fiber that is everywhere thinner than 200 microns except for an infinitely thin center diameter, and thus no more than half of applicant's claimed thickness, Ichikawa actually teaches away from applicant's concept of achieving acoustic absorption of radiation having a wavelength less than about 10 micrometers in SiC by providing a SiC body that is at least 200 microns thick. Even with a 200 micron diameter, Ichikawa would not achieve any appreciable IR acoustic absorption at less than 10 micrometers.

All of the claims rejected over prior art (1-5, 7-21) recite detection at less than about 10 micrometers, all but claims 14-18 recite detection by acoustic absorption, and all but claims 19-21 require that the SiC body have a thickness of at least about 400 micrometers. Thus, all of the claims recite one or more patentable features.

Applicant also takes issue with some of the general comments in the Office action:

1) "Ichikawa fails to specifically disclose that the thickness of the SiC body is at least 400 micrometers, however using a thicker body would have been obvious to one having ordinary skill in the art…"

Actually, going to a thicker body would not have been obvious, since the greater thickness was discovered by applicant to enable detection by acoustic absorption, an absorption mechanism that had not previously been known for SiC (see specification page 3, lines 7-12).

2)"…discovering the optimum or workable ranges involves only routine skill in the art…especially given that a higher thickness for the SiC body does not improve the absorption but merely changes its size."

Actually, acoustic absorption in SiC at wavelengths shorter than about 10 micrometers is not observable at less than about 200 micrometers thickness. "By using SiC with a thickness of at least 200 micrometers, and preferably greater than about 400 micrometers, it has been discovered that an acoustic absorption mechanism exits that can be used to detect radiation at less than 10 micrometers. The absorption increases with increasing thickness, up to a thickness of about 2,000 micrometers." (Specification page 3, lines 7-13).

3) "...since Ichikawa does not disclose that the thickness of the body F changes throughout or that its surface roughness changes, it is assumed that the body F has uniform thickness and a flat surface."

Actually, body F of Ichikawa is shown as having a circular cross-section in FIGs. 1(b), 2(a) and 2(b), and is referred to as having a "monofilament diameter" at column 1, lines 63-64.

All of the claims presently in the application are in proper form for allowance, and a notice of Allowance is respectfully requested.

Respectfully submitted,

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